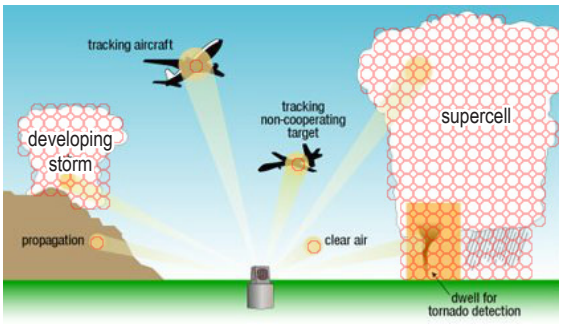
NOAA

National Severe Storms Laboratory

NOAA's National Severe Storms Laboratory (NSSL) researches ways to observe and predict severe weather to save lives and reduce economic loss. NSSL scientists and engineers work to understand the causes of severe weather and explore innovative ways to use that knowledge to improve forecasts and warnings. NSSL transfers scientific understanding, applications, and techniques to decision-makers to support a Weather-Ready Nation.

NWRT/MPAR

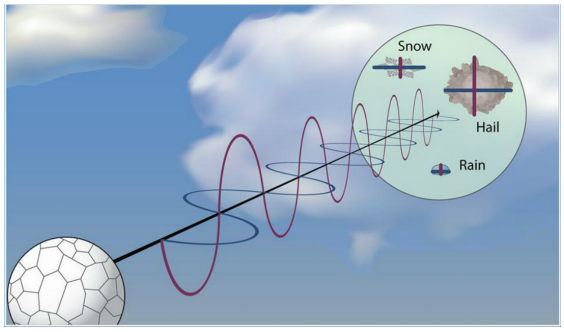
NSSL's National Weather Radar Testbed (NWRT) Multi-function Phased Array Radar (MPAR) program builds and tests multi-function phased array radar technology for simultaneous weather and aircraft tracking. Phased array radar can scan the sky in less than a minute, five to ten times faster than the current operational weather radars. In a 2013 study, NSSL researchers found that NOAA National Weather Service (NWS) forecasters using phased array radar data in simulated severe weather events made warning decisions an average of five minutes faster than the control group.



The Multi-function Phased Array Radar program (MPAR) investigates whether a single radar system can perform both aircraft and weather surveillance.

Dual-polarization radar technology

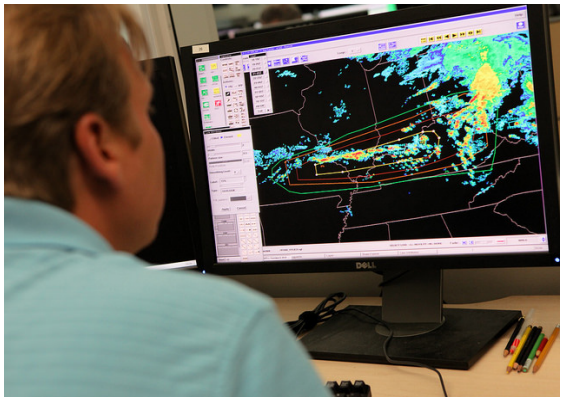
NSSL's developed, tested, and helped implement dual-pol technology, now installed on all NOAA Next Generation Weather Radar (NEXRAD) weather radars. NSSL's dual-pol research spanned more than 30 years, and is an example of a highly successful research to operations project. NSSL now develops and improves NEXRAD dual polarization radar algorithms that sort data into types of liquid or frozen precipitation, and non-weather targets such as bugs, bats, or debris from tornado damage. These algorithms help forecasters quickly assess a precipitation event to make more accurate estimates of how much will fall.



NSSL's dual-polarization research is an example of a revolutionary research-to-operations success.

NOAA Hazardous Weather Testbed

Researchers and forecasters work side-by-side throughout the year in the NOAA Hazardous Weather Testbed (HWT) to develop, test and evaluate new forecast and warning strategies. Participants explore innovative radar and satellite technologies, decision support systems, and new weather and water prediction models. This collaborative approach promotes effective transfer of research into forecasting and warning operations.



Researchers and forecasters regularly work together in the NOAA Hazardous Weather Testbed to improve decision-support products.

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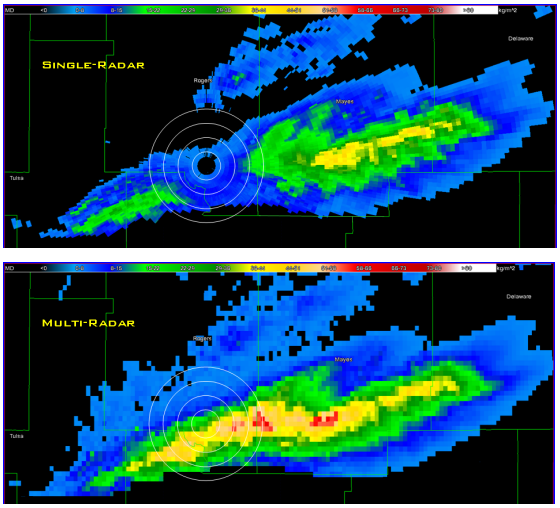
MRMS

Multi Radar Multi Sensor (MRMS) is a system that efficiently combines data streams from multiple radars, surface and upper air observations, lightning detection systems, and satellite and forecast models. MRMS was developed to support forecaster decision-making and improve severe weather forecasts and warnings, as well as hydrology, aviation, and numerical weather prediction. The MRMS system was jointly developed by NSSL and the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), and is being transitioned into NWS operations.



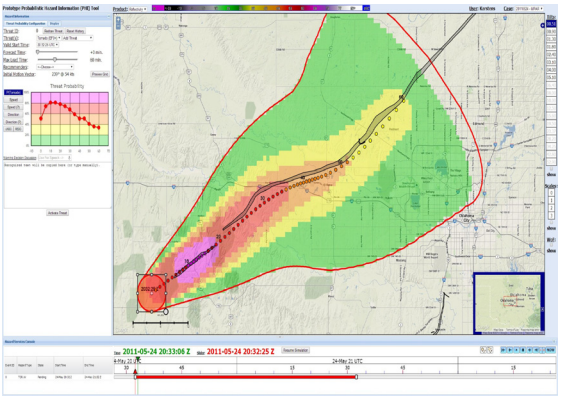
MRMS uses multiple sources of data to support forecaster decision-making.

Warn-on-Forecast

NSSL's Warn-on-Forecast research project aims to create weather model predictions of storm-specific hazards such as tornadoes, large hail, and extreme local rainfall up to an hour before they strike. The models will also provide real-time statistical projections of a storm's longevity, intensity and hazards from NSSL's database of climatological storm-scale behavior.

FACETs

Forecasting A Continuum of Environmental Threats (FACETs) is a proposed next-generation severe weather forecasting concept that is modern, flexible, and designed to communicate user-specific, understandable weather threat information.



This prototype Probabilisitic Hazard Information tool used MPAR data from WoF guidance for 24 May 2011. The forecast uncertainty of the location of the tornado is highlighted in colors related to the risk. The black line outlines the actual path of the tornado.

FLASH

The Flooded Locations And Simulated Hydrographs (FLASH) model uses high-resolution rainfall observations in real-time to produce detailed flash flood forecasts up to 6 hours in advance with a five minute update cycle. The FLASH model was able to predict a catastrophic flash-flooding event in Oklahoma City because of how it represents surfaces in urban zones that do not absorb water, dynamic soil moisture conditions, and routing of water downstream.

CI-FLOW

Coastal and Inland Flooding Observation and Warning (CI-FLOW) is a demonstration project that predicts the combined effects of coastal and inland floods for the coast of North Carolina. CI-FLOW captures the complex interaction between rainfall, river flows, waves, tides and storm surge and how they impact ocean and river water levels.

NSSL works to improve flood and flash flood forecasts and warnings.